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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,472	02/11/2004	Daniel James Branagan	NANO004U	4067

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EXAMINER	
ZHENG, LOIS L	
ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,472	BRANAGAN, DANIEL JAMES	
	Examiner	Art Unit	
	LOIS ZHENG	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6,7 and 11-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6,7 and 11-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 25 September 2008 has been entered.

Status of Claims

2. Claims 6 and 11 are amended in view of applicant's amendment filed 25 September 2008. Therefore claims 6-7 and 11-16 are currently under examination.

Claim Interpretation

3. Regarding claims 6 and 11, since no specific order is required for executing processing steps, the examiner is interpreting that the sequence of the claimed processing steps can take place in any order. In addition, since processing steps recite the same iron based metallic coating alloy and the metal surface is relatively clean(i.e. the cleaned surface may still contain oxides) with the application of the iron based metallic coating alloy, the examiner is interpreting that the claimed processing step of applying the liquid metal of the iron based alloy to an oxidized metal surface to provide a clean metal surface and the claimed processing step of applying an iron based metallic coating alloy to the clean metal surface may take place simultaneously(i.e.

these two processing steps are the same coating application step) based on the broadest reasonable interpretation.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 6-7 and 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dorfman US 4,822,415(Dorfman), and further in view of Branagan et al. US 6,125,912 (Branagan).

Dorfman teaches thermal spraying processing using an iron based alloy powder to produce a protective coating(abstract, col. 1 lines 6-9). Dorfman's iron based alloy composition comprising Cr, B and C(abstract, col. 2 line 66 – col. 3 line 65). Dorfman further teaches that preferably, less than 15% manganese can be included in the iron based alloy to improve corrosion resistance and ductility, preferably Zr, Nb, Ti, Va, Hf in a total amount of less than 10% can be added to further improve wear and corrosion resistance, and preferably phosphorous in an amount of less than 1% can be added to reducing melting point(col. 4 lines 6-18). The iron based alloy powder as taught by Dorfman can be produced by standard method such as atomization and the thermal spray process using the iron based alloy powder produces a coating that is entirely amorphous(col. 4 lines 53-63). Dorfman further teaches that the thermal spraying process is a plasma spraying process(col. 1 lines 24-39).

Regarding claim 6 and 11, the thermal spraying process as taught by Dorfman includes the claimed step of providing an atomized iron based metallic coating alloy comprising the claimed deoxidizing elements including manganese, a metal selected from Cr, Va, Ti, Zr, Hf, Nb and combination thereof and an oxygen seeking nonmetal/metalloid including boron. The thermal spraying process as taught by Dorfman also inherently teaches the claimed melting step, the claimed step of application of iron based metal alloy to a metal surface to provide a coating layer. The claimed removing of oxidized metal surface layer, which reads on a metal surface with a native oxide layer, to provide a relatively clean metal surface is inherently taking place in the coating application process of Dorfman.

However, Dorfman does not teach that the thermal spraying process is a process of metallic coating by claimed high velocity oxy-fuel spraying technique.

Branagan teaches that iron based alloys are especially useful for spray coating processes such as high-energy plasma, low pressure plasma spraying, high velocity oxy-fuel and other spray forming processes(col. 3 lines 1-10).

Therefore, one of ordinary skill in the art would have found it obvious to have substituted the plasma thermal spraying technique in the process of Dorfman with high velocity oxy-fuel spraying technique with expected success since Branagan teaches that plasma spraying and high velocity oxy-fuel functional equivalent thermal spraying process suitable for producing a iron based metallic coating.

In addition, the total amount of deoxidizing elements in the iron based metal alloy as taught by Dorfman in view of Branagan overlaps the claimed deoxidizing element

amount of 5-70%. Therefore, a prima facie case of obviousness exists. See MPEP 2144.05. The selection of claimed deoxidizing element amount range from the disclosed range of Dorfman in view of Branagan would have been obvious to one skilled in the art since Dorfman in view of Branagan teach the same utilities in the disclosed deoxidizing element amount range.

Furthermore, regarding the claimed coating thickness of 40-110mil, Example 1 of Dorfman produces a coating thickness of up to 1.3 mm(col. 5 lines 59-61), which overlap the claimed coating thickness. In addition, it is well known in the coating art that the coating thickness depends on the desired level of protection which varies for different applications. It is also well known in the coating art that the coating thickness is determined by the length of coating time. In other words, the longer the metal surface is sprayed with the coating composition, the thicker the coating becomes. Therefore, it would have been obvious to one of ordinary skill in the art to have varied the coating time via routine optimization in order to achieve desired coating thickness for desired level of protection for the metal substrate.

Furthermore, the examiner takes a position that the claimed ASTM C633 bond strength is an inherent property of the metallic coating layer. Since Dorfman in view of Branagan teach a coating process that is substantially the same as the claimed coating process using an iron based alloy that is substantially the same as the claimed iron based coating alloy, the coating layer formed by the process of Dorfman in view of Branagan would also have an ASTM C633 bond strength that is substantially the same as the claimed and is also present in the claimed coating thickness. In other words, one

of ordinary skill in the art would have found the claimed ASTM C633 bond strength of at least 12,000psi obvious in a coating thickness from 40-110mil formed by the coating process of Dorfman in view of Branagan because Dofman in view of Branagan use the substantially the same metallic coating as claimed in a substantially the same coating process as claimed.

Regarding claim 7, Dorfman further teaches that iron based alloys with lower boron content exists in amorphous form if produced by quenching(col. 4 lines 26-30). Therefore, the examiner concludes that the process of Dorfman in view of Branagan does not produce precipitate when the iron based alloy is melted.

Regarding claim 12, Dorfman further teaches the claimed oxygen seeking non-metal/metalloid such as carbon and phosphorous.

Regarding claims 13-16, the less than 15% of Mn as taught by Dorfman in view of Branagan encompasses the claimed about 2.3% and the claimed about 0.8% Mn. Therefore, a prima facie case of obviousness exists. See MPEP 2144.05. The selection of claimed Mn amount range from the disclosed range of Dorfman in view of Branagan would have been obvious to one skilled in the art since Dorfman in view of Branagan teach the same utilities in the disclosed Mn amount range.

Response to Arguments

6. Applicant's arguments filed 25 September 2008 have been fully considered but they are not persuasive.

In the remarks, applicant argues that Dorfman in view of Branagan do not teach the claimed ASTM C633 bond strength of at least about 12,000pasi when coating has a thickness from 40-110mil.

The examiner submits that Dorfman in view of Branagan do not explicitly teach the claimed bond strength with claimed coating thickness range. However, Dorfman in view of Branagan teach a process of forming a metallic coating that is substantially the same as claimed process(i.e. using substantially the same metallic coating composition and the same high velocity oxy-fuel spraying technique). Therefore, one of ordinary skill in the art would have expected the bonding strength of the resulting coating layer by the process of Dorfman in view of Branagan to be substantially the same as claimed within the claimed coating thickness. In addition, the claimed coating thickness is a result effective variable which can be manipulated by adjusting the coating time. One of ordinary skill in the art would have found the claimed coating thickness obvious via routine optimization in order to achieve desired protective properties in the coating.

Applicant further argues that Dorfman in view of Branagan do not recognize that utilizing HVOF spraying technique the claimed bond strength would be present in coating thickness of 40-110mil and remain relatively stable over a number of substrates.

The claimed bond strength present in the claimed coating thickness describes what inherently happens when HVOF spraying technique is used. Since Dorfman in view of Branagan teaches substantially the coating process using the same HVOF spraying technique, one of ordinary skill in the art would have expected the same bonding strength to occur in the same coating thickness as claimed. In addition, the

instant claims do not require that the bond strength to remain relatively stable over a number of substrates.

Applicant further argues the claimed bond strength of HVOF produced coating is unexpected, Dorfman in view of Branagan does not recognize the criticality of maintaining the bond strength over claimed coating thickness range.

The examiner would like to remind the applicant that any objective evidence such as unexpected result must be factually supported by an appropriate affidavit or declaration to be of probative value. See In re De Blauwe, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984) and MPEP 716.01(c). Evidence of unexpected properties may be in the form of a direct or indirect comparison of the claimed invention with the closest prior art which is commensurate in scope with the claims. See In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and MPEP § 716.02(d) - § 716.02(e). Since the proof of factual evidence is lacking in applicant's assertion of unexpected results, the examiner does not find the argument persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LOIS ZHENG whose telephone number is (571)272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

LLZ
12/18/08